From beef to beans: Eating motives and the replacement of animal proteins with plant proteins among Finnish consumers

Annukka Vainio[1]

Mari Niva[2]

Piia Jallinoja[3]

Terhi Latvala[4]

[1] (corresponding author) Natural Resources Institute Finland (Luke), Helsinki, Finland, annukka.vainio@luke.fi
[2] Consumer Society Research Centre, University of Helsinki, Helsinki, Finland, mari.niva@helsinki.fi
[3] Consumer Society Research Centre, University of Helsinki, Helsinki, Finland, piia.jallinoja@helsinki.fi
[4] Natural Resources Institute Finland (Luke), Helsinki, Finland, terhi.latvala@luke.fi

- Motives related to dietary change towards plant proteins were examined
- Six clusters with different beef, beans, and soy product use patterns were found
- Natural, health, and weight concerns were the main motives in a dietary change
- Convenience and price motives are barriers to substituting beef with plant proteins
- Social motives were high among those undergoing a dietary change

ABSTRACT

A better understanding of the motives underlying the adoption of sustainable and healthy diets is needed for designing more effective policies. The aim of the study was to examine how eating motives were associated with self-reported changes in the consumption of beef, beans, and soy products, i.e., changes related to reducing animal and increasing plant proteins. The study analysed a survey of an adult population living in Finland (N = 1,048). The eating motives were measured with the Eating Motivation Survey (TEMS), which distinguishes between 15 eating motives. Six clusters of consumers based on self-reported changes in food choices were identified with latent class analysis (LCA). Four clusters had established food consumption patterns ("Beef only", "Beef and beans", "Beef, beans, and soy products", and "No beef"), one was undergoing a change, and one had attempted a change earlier. ANOVA with planned contrasts revealed that the motives relating to natural concerns, health, and weight control were higher, and convenience and price lower, among those who had an established diet including beans and soy products, as compared to those who consumed only beef. Those undergoing a dietary change expressed a higher endorsement of natural concerns as well as health, sociability, social image, and price motives than those with an established diet including beans and soy products. The results suggest that eating motives play an important role in changing towards more sustainable food consumption patterns in which meat/beef is replaced with plant proteins.

Keywords: motivation, food choice, consumers, sustainable food consumption, vegetable proteins

Highlights:

- Motives related to dietary change towards plant proteins were examined
- Six clusters with different beef, beans, and soy product use patterns were found
- Natural, health, and weight concerns were the main motives in a dietary change
- Convenience and price motives are barriers to substituting beef with plant proteins
- Social motives were high among those undergoing a dietary change

Introduction

It has been widely accepted that food consumption patterns have significant impacts on human health and the environment. Recent discussions on the sustainability of food production and consumption have increasingly paid attention to the role of products of animal origin in causing environmentally hazardous effects, particularly in terms of climate change (Fiala, 2008; Popp, Lotze-Campen, & Bodirsky, 2010; Stehfest *et al*., 2009; York & Gossard, 2004). It has been estimated that substituting meat with plant proteins would significantly reduce the costs of climate change mitigation (Stehfest *et al*., 2009) and would reduce cancer risk associated with the consumption of red meat and processed meat (Nordic Council of Ministers, 2013; World Cancer Research Fund, 2013).

The consumption of meat has steadily increased in Western countries during the past decades (Vinnari & Tapio, 2009; Natural Resources Institute Finland, 2013), whereas that of plant proteins has been stable (de Boer, Helms, & Aiking, 2006). In Finland, meat maintains a central position in meals and food purchases (Vinnari, Mustonen & Räsänen, 2010), as is the case in other European countries. However, social and cultural factors may complicate efforts to diminish meat use, as meat is culturally embedded in Western food cultures as the centre of the meal (Fiddes, 2004). Consumers also value the taste of meat, and many consider it as a healthy and necessary part of the diet (Verbeke *et al*. 2010).

The most fundamental motivation for eating is hunger, but how and what we choose to eat is determined by other factors (Lowe & Levine, 2005). Previous dietary research has examined how behavioural change is associated with habit, motivation, goals, beliefs about own capabilities, and knowledge (Guillaumie, Godin, & Vézina-Im, 2010), as well as attitudes, social norms, self-efficacy, and intention (Rothman, Sheeran & Wood, 2009). However, few studies exist on the association between eating motives and changes in food choices, particularly regarding the transition from meat-based diets to more sustainable eating practices. There is some evidence of

personal motives helping in changing one's food habits. The replacement of animal proteins with plant proteins requires replacing undesired behaviours with new ones, which has been found to be more demanding than initiating new behaviour because motives associated with undesired behaviour may function as barriers (Holland, Aarts, & Langendam, 2006). In such cases, triggering personally relevant motivational cues has been found to be more effective than external situational cues (Adriaanse, de Ridder, & de Wit, 2009).

On one hand, individuals describing their diet as low in red meat have been found to attribute greater importance to health, natural content, weight control and ethical concerns in their food choice as compared to those who describe their diets as conventional, whereas vegetarians have been found to differ significantly from those describing their diets as conventional only with regard to ethical concerns (Pollard, Steptoe & Wardle, 1998). The reasons for adopting a meat-free diet have been found to be associated with health concerns, weight control, animal welfare, and a sense of disgust related to meat (Smith, Burke, &Wing, 2000).

On the other hand, price, taste and convenience have been found to act as barriers to consuming healthy food (Lappalainen *et al*., 1997). More specifically, the less healthy dietary habits among individuals belonging to low socio-economic status (SES) groups are in part attributable to the higher priority given to price and familiarity and the lower priority given to health motives (Konttinen *et al*., 2012). In another study, price was perceived as being the most important barrier to climate-friendly food choices but was only weakly associated with actual food choices; instead, the omission of climate-friendly choices was most strongly explained by habit and disbelief in the effects of food consumption on the climate (Mäkiniemi & Vainio, 2014).

Previous research suggests that dietary change can be divided into different stages and that different automatic and reflective components are involved in these stages. There is evidence that the reflective processes are important in initiating of new behaviours, but also that the maintenance of dietary choices involves the formation of habits that are automatic processes

operating beyond individuals' full awareness. (Rothman *et al*., 2009.) Therefore habits are likely to persist even after conscious motivation decreases (Gardner, de Bruijin, & Lally, 2011). The Transtheoretical Model of behavioural change (TTM; Prochaska & DiClemente, 1984; Rossi *et al*., 2001) suggests that a desired change in behaviour is associated with an increase in awareness of and concern about an issue, as well as with an increase in the perceived importance of positive motives and a decrease in that of negative ones (Freestone & Goldrick, 2007). It has been suggested that repetition is important for habit formation, leading to automaticity characterized by efficiency, lack of awareness, unintentionality and uncontrollability (Bargh, 1994). There is considerable variation in the time taken to replace old habits with new ones, which depends on the complexity of behaviours. For example, Lally *et al*. (2010) found that the average of time required was 66 days but the range varied from 18 to 254.

In this article we examine how eating motives are associated with dietary changes related to reducing animal and increasing plant proteins. We focus on self-reported changes in the consumption of beef, beans, and soy products. We assumed that differences in eating motives would be associated with differences in the participants' diets, and that the endorsement of reflective motives, such as healthiness and natural concerns, would be stronger among those who are currently adopting plant proteins in in their diets as compared to those who have established plant protein consumption. Based on the results we will suggest how policy-makers can take into account the association between eating motives and dietary change in developing new policy measures. Next, we review previous research on eating motives, as well as the consumption of beef and animal proteins, before turning to our empirical analysis and results.

Eating motives

The current study uses The Eating Motivation Survey (TEMS), which is based on a review of eleven previous measures of eating/food choice motives (Renner *et al*., 2012). TEMS

identifies 15 different motivations for food choices: liking the food, visual appeal, pleasure, affect regulation, need/hunger, sociability, social norms, social image, weight control, health, price, convenience, habits, traditional eating, and concern for nature. As a result, TEMS brings together previously developed measures allowing for a fine-grained and multifaceted characterization of motives associated with food choice. Research using TEMS has found that Liking, Habits, Need/Hunger, and Health motivate eating behaviour most often (Renner *et al*., 2012). There is some evidence that motives associated with health may be universal core motives of food choice that have been identified in several previous studies and measures of eating motives (Steptoe *et al*., 1995; Lindeman & Stark, 1999; Schupp & Renner, 2011b). It also appears that health and ethical considerations are an important part of reflective consumer practices (Hjelmar, 2011).

Meat and plant protein consumption in Finland

In Finland, average per capita meat consumption – consisting almost exclusively of pork, beef, and poultry – is slightly below the EU average, but there has been a steady increase (Lihatiedotus, 2015). Research indicates a socio-demographic variation in the consumption of meat. A survey of the health and dietary habits of 15–64-year-old Finns revealed that 43% of the population had eaten meat on three or more days during the week preceding the survey (Helldán *et al*., 2013). One in ten respondents had not eaten meat at all. The frequency of meat consumption decreased with age, and men ate meat more frequently than women. The consumption frequencies also indicated that men with a higher educational level ate meat more often than less-educated men, whereas for women the opposite was found.

Beans have been a part of European diets for centuries (Cubero, 2011; Shurtleff & Aoyagi, 2013). In Finland, broad beans have been cultivated since the 15th century, and have been commonly used for bean soup, for example. Peas, too, have been cultivated and consumed in Finland for centuries and are still currently used as a side dish or as the main ingredient in

traditional pea soup. Other beans or lentils have not been a part of traditional Finnish cuisine or mainstream food culture. Lately, soy products have been introduced on the Finnish market. A study conducted in Finland (Jallinoja *et al*, in press) has shown that Finns eat pulses infrequently. Peas were the most frequently used pulses, whereas soy milk products and other soy products were used the least. More than a half of the respondents never consumed soy products. All pulse foods were consumed much more frequently among vegetarians compared to non-vegetarians. The consumption of plant proteins appeared to increase, as frequent bean consumers also ate other plant proteins often. The study by Jallinoja *et al* (in press) suggests that frequent pulse eating is largely a vegetarian practice in Finland. Indeed, vegetarianism is still a small-scale phenomenon in Finland, with about 4% of the population being vegetarians (Official Statistics of Finland, 2012). The proportion has remained approximately the same since the mid-1980s (Vinnari *et al*., 2010.)

Hypotheses

In this study we examined how eating motives were associated with stability and changes in food consumption patterns relating to animal and plant proteins. Among the various animal proteins we focused on beef, because it is often considered to be the most problematic type of meat in terms of health and environmental effects. Of the plant proteins we chose to analyse beans (i.e., canned or dried beans) and soy products, because both are readily available in supermarkets and are promoted as more environmentally friendly and healthy alternatives to animal protein. We tested the hypothesis that the eating motives of consumers who are undergoing a change in food consumption patterns differ from consumers with established diets. Based on previous research we assumed that a set of motivational drivers (Health, Natural Concerns, and Weight Control) facilitate dietary change, whereas other motives (Price, Convenience and Habit) function as barriers to changing to plant proteins.

We developed more specific hypotheses after identifying the consumer groups. First, based on previous studies, we expected Health, Natural Concerns and Weight Control motives to be higher, and Habit, Price and Convenience to be lower, among those consumers who include beans and soy products in their diet as compared to those who only consume beef (H1) (e.g., Konttinen *et al*., 2012; Lappalainen *et al*., 1997; Mäkiniemi & Vainio, 2014; Pollard, Steptoe, & Wardle, 1998;). Second, we expected Health, Natural Concerns and Weight Control motives to be higher, and Habit, Convenience and Price to be lower, among those undergoing a dietary change towards beans and soy products than among those with an established diet including beans and soy products (H2) (Rothman *et al*., 2009). Third, we expected that those with a previous dietary attempt to consume beans and soy products would endorse higher levels of Habit, Price and Convenience as compared to those whose established diet included beans and soy products (H3) (Konttinen *et al*., 2012; Lappalainen *et al*., 1997; Mäkiniemi & Vainio, 2014). In order to examine whether other motives – the role of which remains unclear according to earlier research – are also significant in the transformation from animal to plant protein, we kept the whole set of the TEMS motives in the analysis.

Materials and methods

Data sample

The data were collected through an online questionnaire with one reminder, directed to the members of a consumer panel by a commercial marketing research company, representative of 15–63-year-old Internet users living in Finland.[5] Of the contacted consumers, 16% completed the questionnaire, yielding 1,048 complete answers. Such a response rate can be regarded as fairly common in internet surveys, where response rates are typically below 25% (see e.g., Dillman *et al.*,

[5] In 2011, approx. 85% of Finnish households had Internet connection and 89% of Finns between 16 and 74 years of age had used the Internet during the last three months. Those between 16 and 54 years of age used the Internet most frequently (SVT, 2011).

2009). As consumers are frequently asked to answer email questionnaires, it was expected that many would ignore the solicitation.

Table 1. Age, gender distribution, highest education level, and living area in the Finnish population (Official Statistics of Finland, 2012) and in the data sample.

	Finnish population %	Data sample %
Age		
15–24 years	19	19
25–44 years	38	38
45–64 years	43	43
Gender		
male	49	42
female	51	58
Highest education		
Basic level[a]	25	24
Secondary level[b]	44	19
Tertiary level[c]	31	57[d]
Region		
Helsinki-Uusimaa	30	29
Southern Finland	22	23
Western Finland	25	25
Northern and Eastern Finland	24	22

Notes. [a] Certificates from primary schools, middle schools and comprehensive schools; [b] matriculation examinations, vocational qualifications; [c] polytechnic degrees, lower and higher university degrees; [d] including diplomas in Business and Administration no longer in use in official statistics.

The mean age of the participants was very close to that of the general population (Table 1). Women were slightly over-represented in the data compared to population statistics. The respondents were somewhat better educated than the overall population; however, this difference may have resulted in part from the slightly different classifications used between Statistics Finland

and those used in this survey. Moreover, 6.7% of the participants were vegetarians as compared to 4.2% of the Finnish population (Official Statistics of Finland, 2012). All in all, apart from the level of education, the discrepancies between the data and population statistics are small enough to conclude that the data are reasonably representative of the Finnish population. Unweighted data were used to test the hypotheses.

Measures

The analysed variables were part of a longer questionnaire. We included the items measuring eating motives (TEMS scale, Renner *et al.*, 2012), self-reported past and planned changes in consumption of beef, bean and soy products, and socio-demographic variables.

TEMS scale. We used a brief version of TEMS including 45 items where three items measured each eating motive. The participants were requested to indicate, on a 7-point scale (1= "never applies", 7 = "applies always"), how relevant the eating motives were to explaining why they consumed the food that they did. The English version of TEMS was translated into the Finnish language by two researchers. The Finnish translation was compared to the original German version by a researcher who was bilingual in Finnish and German. The Finnish translation was a pilot tested qualitatively, allowing the participants to freely comment on the items. Based on the discussions, two items measuring Sociability ("because it is social" and "so that I can spend time with other people") were replaced with the items "because other people eat it" and "because it is pleasant to eat with others". The revised version was tested on a targeted sample of potential pulse consumers.

Changes in food consumption patterns. The participants were requested to indicate how their consumption of three food items – beef, beans and soy products – had changed during the previous 2–3 years on a four-point scale (1 = "no consumption", 2 = "consumption has decreased", 3 = "consumption has remained stable", 4 = "consumption has increased"). Each food item was measured separately. The participants were then requested to indicate how they expected

their consumption of these three food items would change in the coming 2−3 years on the same 4-point scale. These time frames were chosen because we wanted the respondents to reflect on their eating patterns a few years earlier and to speculate about the future, without asking them to identify exact times, which would probably have been difficult to remember or anticipate. We also included the participants' self-reported consumption of poultry and fish in the analysis as background variables.

Moreover, the participants were requested to indicate their gender, age, highest level of education (recoded into 1 = no professional degree, 3 = university degree), and the size of their place of residence (1 = more than 100,000 inhabitants, 2 = at least 15,000 inhabitants, 3 = less than 15,000 inhabitants).

The participants were requested to indicate whether they followed a special diet (vegetarian, vegan, low carbohydrate, low salt, gluten-free, low lactose, food allergy elimination diet, or other). The responses were recoded into two categories: "no special diet" and "special diet".

Statistical methods

The reliability of the TEMS scale including 15 factors was verified with confirmatory factor analysis (CFA) using AMOS version 21.0 (Arbuckle, 2011). *CFA* assesses the fit of a measurement model (the associations of the scale items to their designated latent variables) and a structural model (the associations between latent variables). Several fit indices were used to assess the goodness of fit of the model. The χ^2/df index ≤ 3 (Carmines & McIver, 1981), the *CFI* index $\geq$ .95 (Bentler & Bonett, 1980), and the *RMSEA* index $\leq .05$ (Browne & Cudeck, 1993) indicate an excellent fit. Indices based on χ^2 were interpreted with caution. This is because with large samples, even small failures in the model will be highly significant.

Latent class analysis (LCA) with Latent Gold 4.5 was used to form consumer clusters based on participants' self-reported consumption of beef, beans, and soy products. *LCA* identifies

unobservable clusters of individuals based on patterns in the observed variables (Magdison & Vermut, 2002). Alternative models ranging from a model with one class to a model with eight classes were estimated. With 6 nominal indicators the data is likely to be sparse, and in such cases the L^2 statistic does not follow a chi-squared distribution (Magdison & Vermut, 2004). In such cases it is recommended to use the BIC value to compare the models. The model with the lowest BIC value was a 6-class model, and this was chosen for further analysis (*BIC* = 10,940, *AIC* = 10,380, Npar = 113, L^2 =1107.264, *df* = 935, *p* =7.90E−05).

Socio-demographic variables and the self-reported consumption of poultry and fish were used in the LCA model as inactive covariates, meaning that their effect was not included in the estimation of the model but that they provided useful descriptive information on the cluster members and their dietary changes. ANOVA was used to compare eating motives between the clusters, and the mean scores for the eating motives were used. We also took into account that these variables were normally distributed and that none of the assumptions of the one-way ANOVA were violated. Three sets of planned contrasts were conducted to examine the relationships between eating motives and food consumption patterns. The first set of contrasts was conducted between the clusters including those who consumed only beef vs. those including both beans and soy products in their diets (H1). The second set of contrasts was conducted between the clusters representing an established consumption of both beans and soy products vs. ongoing dietary change (H2). The third set of contrasts was conducted between the clusters representing an established consumption of both beans and soy products vs. a past (but failed) dietary attempt to consume beans or soy products (H3).

Results

Validity of the TEMS scale

301 The *CFA* model exhibited an excellent fit with the data sample (χ^2 = 2,414.666***,
302 *df* = 840, χ^2/df = 2.875, *CFI* = .929, *RMSEA* = .042). Factor loading ≥ .30 (Kline, 2011) and
303 Cronbach's alpha ≥ .60 were used as a cut-off for high construct validity. All factor loadings were
304 high, and the Cronbach's alpha was in the acceptable range for all factors. Bivariate correlations <
305 .80 were used as a cut-off for satisfactory discriminant validity (Brown, 2006). All bivariate
306 correlations were below .80 (Table 2). The results confirm the overall validity of TEMS for the
307 Finnish sample.
308
309 *Clusters based on changes in the consumption of beef, beans, and/or soy products*
310 Six consumer clusters were identified based on past changes and future intentions
311 regarding the consumption of three food items: beef, beans, and soy products. The 6-cluster *LCA*
312 model provided diverse cluster sizes varying from 7.5% to 25.4% (Table 3). The R^2 values indicated
313 that the proportion of variance explained by the 6-class model was highest for the future
314 consumption intentions for soy products.
315 Clusters no. 1, 2, 3, and 6 were interpreted as representing established food
316 consumption patterns. The first cluster was the largest, including those who consumed beef and who
317 did not consume beans or soy products ("Only beef"). The second cluster included consumers of
318 both beef and beans, but not soy products ("Beef and beans"). The third cluster included
319 participants who consumed beef, beans and soy products ("Beef, beans and soy products"). The
320 sixth cluster of participants had a stable past consumption of both beans and soy products and no
321 consumption of beef ("No beef"). All clusters reported that their consumption patterns would
322 remain the same in the future.

323 **Table 3.** Clusters based on self-reported changes in the consumption of beef, beans, and/or soy products (values are percentages).

	Established diet				Ongoing dietary change towards plant proteins	Past dietary attempt towards plant proteins	Wald	p-value	R^2
	Beef only	Beef and beans	Beef, beans and soy products	No beef					
Cluster size %	25.4	23.2	23.0	7.5	12.1	8.9			
	Cluster 1	Cluster 2	Cluster 3	Cluster 6	Cluster 4	Cluster 5			
Past change: beef							121.14	0.000	0.31
No consumption	0.03	0.00	0.01	1.00	0.00	0.00			
Consumption has decreased	0.14	0.25	0.13	0.00	0.74	0.36			
Consumption has remained stable	0.76	0.67	0.81	0.00	0.19	0.54			
Consumption has increased	0.06	0.08	0.06	0.00	0.07	0.10			
Past change: beans							144.36	0.000	0.48
No consumption	1.00	0.01	0.14	0.08	0.01	0.54			
Consumption has decreased	0.00	0.09	0.03	0.01	0.01	0.29			
Consumption has remained stable	0.00	0.74	0.76	0.54	0.39	0.15			
Consumption has increased	0.00	0.15	0.07	0.37	0.60	0.02			
Past change: soy products							155.34	0.000	0.43
No consumption	1.00	0.99	0.35	0.09	0.10	0.43			
Consumption has decreased	0.00	0.00	0.05	0.05	0.06	0.34			
Consumption has remained stable	0.00	0.01	0.56	0.55	0.43	0.12			
Consumption has increased	0.00	0.00	0.04	0.31	0.41	0.10			
Future consumption: beef							139.81	0.000	0.36
No consumption	0.02	0.00	0.00	0.99	0.00	0.01			
Consumption will decrease	0.12	0.22	0.09	0.00	0.70	0.24			
Consumption will remain stable	0.83	0.74	0.90	0.00	0.30	0.68			
Consumption will increase	0.03	0.04	0.01	0.01	0.00	0.06			
Future consumption: beans							249.71	0.000	0.52
No consumption	0.92	0.03	0.00	0.04	0.00	0.21			
Consumption will decrease	0.00	0.03	0.00	0.00	0.01	0.09			
Consumption will remain stable	0.03	0.77	0.95	0.61	0.28	0.46			
Consumption will increase	0.05	0.17	0.05	0.35	0.71	0.24			
Future consumption: soy products							165.34	0.000	0.70
No consumption	0.98	0.98	0.00	0.04	0.00	0.05			
Consumption will decrease	0.00	0.00	0.01	0.00	0.01	0.21			
Consumption will remain stable	0.00	0.00	0.97	0.68	0.45	0.49			
Consumption will increase	0.02	0.02	0.02	0.28	0.54	0.25			

The fourth cluster was interpreted as being at the middle of an ongoing change towards plant proteins. The participants had already reduced their consumption of beef and increased their consumption of both beans and soy products ("Ongoing dietary change towards plant proteins"). Moreover, they had intentions to decrease their consumption of beef and increase their consumption of beans and soy products.

The fifth cluster was interpreted as representing past attempts to consume beans and soy products. It included participants who either did not consume beans or soy products or had reduced their consumption of beans and soy products ("Past dietary attempt towards plant proteins"). In this cluster, the consumption of beef, beans, and soy products was most likely to remain the same in the future.

The items measuring poultry and fish consumption were used as inactive covariates in the analysis and for interpreting dietary changes in the clusters (Table 4). The participants belonging to the first three clusters ("Beef only", "Beef and beans", and "Beef, beans, and soy products") had stable past consumption of poultry and fish, and this trend was seen as remaining stable in the future. The fourth cluster ("Ongoing dietary change towards plant proteins") had a diffuse consumption trend towards poultry. In this cluster, the past consumption of fish was either stable or had increased, and was likely to increase in the future. Participants in the fifth cluster ("Past dietary attempt towards plant proteins") consumed poultry and fish regularly and had intentions to increase their fish consumption. The participants in the sixth cluster ("No beef") most likely did not consume poultry and consumed fish regularly.

Table 4. Sociodemographic characteristics and dietary patterns associated with the clusters (%).

	Established diet				Ongoing dietary change towards plant proteins	Past dietary attempt towards plant proteins
	Beef only	Beef and beans	Beef, beans and soy products	No beef		
Gender						
female	54	55	48	86	70	64
male	46	45	52	14	30	36
Age group						
15–24 years	15	17	16	27	29	24
25–34 years	18	21	18	38	28	18
35–49 years	27	30	35	22	24	29
50–64 years	40	31	31	13	18	28
Level of education						
no professional degree	22	23	22	23	28	32
vocational degree	27	16	16	14	16	21
university degree	52	60	62	63	56	48
Place of residence						
at least 100,000 inhabitants	34	45	47	65	56	52
at least 15,000 inhabitants	43	42	39	26	34	36
under 15,000 inhabitants	23	13	14	9	11	12
Diet						
Does not follow a specific diet	74	72	73	10	64	63
Follows a specific diet	26	28	27	90	36	37
Past change: poultry						
No consumption	2	1	1	67	6	1
Consumption has decreased	5	5	10	12	27	15
Consumption has remained stable	66	57	65	15	39	52
Consumption has increased	27	37	24	6	27	32
Past change: fish						
No consumption	7	2	4	27	3	5
Consumption has decreased	9	10	8	12	9	12
Consumption has remained stable	57	52	61	42	39	45
Consumption has increased	27	36	27	19	49	38
Future consumption: poultry						
No consumption	2	1	1	65	5	1
Consumption will decrease	3	7	5	13	38	9
Consumption will remain stable	86	82	88	19	44	74
Consumption will increase	9	10	6	2	12	15
Future consumption: fish						
No consumption	6	3	2	30	2	4
Consumption will decrease	0	2	1	10	7	4
Consumption will remain stable	68	62	73	51	31	44
Consumption will increase	26	33	24	9	59	49

374 **Table 5.** ANOVA with planned contrasts where an established diet including beef only (a), ongoing dietary change toward the replacement of
375 meat with beans and soy products (c), and past dietary change (d) were compared to an established diet including beans and soy products (b).
376

	(a) Beef only		(b) Established beans & soy products consumption		(c) Ongoing dietary change		(d) Past dietary attempt		Contrast (a) vs. (b)	Contrast (c) vs. (b)	Contrast (d) vs.(b)
Group size %	25.4		23.0		12.1		8.9				
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F(1,598)	F(1,457)	F(1,409)
Liking	5.41	0.85	5.40	0.79	5.51	0.74	5.54	0.92	0.01	1.83	1.93
Habits	4.84	0.88	4.77	0.78	4.83	0.81	4.92	0.95	1.11	0.56	2.05
Need & hunger	5.01	0.97	4.88	0.96	5.06	0.97	4.91	1.05	2.60	3.20	0.07
Health	4.25	1.24	4.62	1.04	4.85	1.17	4.67	1.19	16.69*** (a<b)	4.13* (b<c)	0.10
Convenience	4.72	0.98	4.48	0.97	4.48	0.99	4.53	0.84	8.73** (a>b)	0.00	0.16
Pleasure	3.95	1.04	4.00	0.98	4.13	0.99	4.01	1.14	0.35	1.71	0.02
Traditional eating	3.77	1.06	3.66	0.95	3.77	0.89	3.74	1.02	1.83	1.25	0.50
Natural concerns	3.18	1.29	3.80	1.28	4.14	1.34	3.69	1.35	34.16*** (a<b)	6.18* (b<c)	0.46
Sociability	3.51	1.16	3.50	1.08	3.77	1.01	3.65	1.21	0.01	6.14* (b<c)	1.15
Price	4.27	1.10	4.07	1.14	4.37	1.06	4.39	1.13	4.62* (a>b)	6.51* (b<c)	5.00* (b<d)
Visual appeal	2.68	1.04	2.76	1.03	2.75	0.92	2.86	1.15	.95	0.02	0.56
Weight control	3.15	1.34	3.37	1.26	3.39	1.27	3.49	1.23	4.22* (a<b)	0.02	0.58
Affect regulation	1.95	1.00	2.08	1.06	2.17	1.10	2.16	1.08	2.47	0.68	0.35
Social norms	2.47	1.06	2.60	0.95	2.59	1.02	2.62	1.14	2.45	0.01	0.04
Social image	1.97	0.89	2.11	0.90	2.30	0.84	2.12	0.99	3.19	4.66* (b<c)	0.02

ANOVA with planned contrasts between the mean of each cluster and that of other clusters was used to compare socio-demographic characteristics and self-reported diet. The following statistically significant differences were found. Relatively more males emerged in the three clusters representing a stable consumption of beef, beans and/or soy products, and relatively more females in the "no beef" cluster. The participants in the three clusters representing stable consumption of beef, beans and/or soy products were relatively older, whereas the "no beef" cluster and those undergoing a dietary change towards plant proteins were relatively younger than other participants. Those undergoing a dietary change towards plant proteins were somewhat more likely than others to have a low level of education than other participants. Participants consuming only beef were more likely to live in small towns or in the countryside whereas the "no beef" cluster was more likely to live in the larger cities. Moreover, this cluster reported a greater likelihood of adhering to a special diet (most often vegetarian or vegan).

Hypothesis testing: Planned contrasts

ANOVA with three sets of planned contrasts were conducted to test the research hypotheses. The first set of planned contrasts was conducted between those whose diets included both beans and soy products (clusters 3 and 6) vs. the cluster consuming only beef (cluster 1). Five statistically significant differences emerged (Table 5). The participants whose diets included beans and soy products endorsed higher levels of Natural Concerns, Health, and Weight Control than those who consumed only beef. Moreover, the participants whose diets included beans and soy products endorsed lower levels of Convenience and Price than those who consumed only beef. There was no difference in Habit between the groups, thus confirming Hypothesis 1 in five of the six hypothesized differences in eating motives.

The second set of planned contrasts was conducted between the cluster representing ongoing change (cluster 4) vs. the clusters representing established diets including beans and soy

products (clusters 3 and 6). Five statistically significant differences emerged. The participants undergoing a dietary change endorsed higher levels of Natural Concerns, Health, Sociability, Social Image and Price than those with an established diet including beans and soy products. Concerning Health and Natural Concerns, Hypothesis 2 was confirmed. However, the difference in Price was contrary to what was hypothesized. Moreover, Sociability and Social Image were not included in Hypothesis 2, but turned out to play a role in dietary changes towards plant proteins.

The third set of planned contrasts was conducted between the cluster representing a past attempt to consume beans and soy products (cluster 5) vs. the clusters representing established diets including beans and soy products (clusters 3 and 6). One statistically significant difference emerged. The participants with a past dietary attempt endorsed a higher level of Price as compared to those with an established diet. There was no difference in Habit and Convenience between the groups and therefore Hypothesis 3 was partially confirmed.

Discussion

In this article we tested the assumption that changes in diet regarding animal and plant proteins are associated with differences in eating motives. We found evidence of some eating motives being positively related to dietary change towards the replacement of animal proteins with plant proteins, whereas other motives could be interpreted as barriers to change. The participants whose diets included beans and soy products endorsed a higher level of natural concerns, health, and weight control motives and a lower level of convenience and price motives than those who did not consume beans and soy products. Moreover, participants who were undergoing a dietary change towards the consumption of plant proteins endorsed a higher level of natural concerns, as well as health, sociability, social image, and price motives than those with an established diet including beans and soy products. On the other hand, those with a past dietary attempt endorsed a higher level of price motive than those with an established diet.

These findings suggest that natural concerns, as well as health and weight control motives are important for adopting and maintaining potentially more sustainable and healthier diets (e.g., Carlsson-Kanayama & González, 2009; Godfray *et al*., 2010; World Cancer Research Fund, 2013; Nordic Council of Ministers, 2012). This is in line with previous findings suggesting that these three motives represent higher-order core motives (Renner *et al*., 2012). Moreover, it appears that the endorsement of the core motives of health and natural concerns is even higher among consumers undergoing dietary change as compared to those with an established diet with beans and soy products, suggesting that these motives may function as a motivational force during dietary change.

Moreover, we found evidence that convenience and price motives function as barriers to substituting meat with plant proteins. These motives were higher among those who consumed only beef as compared to those with an established diet including beans and soy products. Surprisingly, the price motive was higher among those undergoing a dietary change towards increased use of beans and soy products, as compared to those with an established diet including beans and soy products. It is possible that price is one motive for replacing meat with vegetable proteins because in Finland beans and soy products usually cost less than meat. It is also possible that those who replace beef with beans and soy products constantly compare price differences between various products and therefore are likely to pay more attention to price during periods of dietary transition. In contrast, those with an established diet including plant proteins do not actively think about the price difference between the products as they are already used to buying and using plant protein products. These findings are in line with previous findings indicating that the importance of motives related to old habits is associated with perceived difficulty in changing one's food habits (Freestone & Goldrick, 2007; see also Prochaska & DiClemente, 1984; Rossi et al., 2001).

The level of social motives – sociability and social image – was high among the consumers undergoing a dietary change, suggesting that the social context is important when adopting new dietary patterns. Strong and supportive social networks have been found to explain successful dietary change (Sorensen *et al*., 2007). However, social motives are not necessarily associated with the consumption of bean and soy products in particular. It is possible that people who are undergoing a dietary change are more prone to mirror their choices to other people and the communities around them, and reflect on how their new diet is impacting their social identities and their "fitting in".

In this article we have suggested that eating motives are associated with changes in diets. However, it is possible that eating motives are, in fact, relatively stable. For instance, those who have heightened concerns over health and weight may also be interested in, and trying, various diets that might enhance their health and help in weight management, and their motives may not necessarily change even though their practices do. This may be the case, for instance, for followers of fad diets, such as a low-carbohydrate diet, who are more likely to regard health and weight-managing aspects of foods as important and place less value on the sociability and pleasures connected to food (Jallinoja et al. 2014).

Limitations. The study was based on an analysis of cross-sectional data, and the causal relationships between eating motives and food consumption patterns remain mainly hypothetical. Opposite causal associations between eating motives and changes in food choices could also be possible. Therefore, longitudinal and experimental studies are needed to better understand the causal mechanisms between eating motives and food consumption patterns. Moreover, the study did not explore the issue of how long it takes to break old food habits and form new ones. There is a need for research focusing on the process of habit development, and, in particular, how motives are associated with different phases of the process. Related to this, more research is necessary to identify whether and how food choice motives change at different phases of dietary change from

476 animal to plant protein, and, if this is the case, how eating motives can be effectively influenced.
477 Moreover, the study analysed self-reported behaviour that is subject to social desirability bias,
478 meaning that the participants might have exaggerated the frequency of socially desirable behaviour
479 (Chung & Monroe, 2003). For example, if the participants did not consume beans and/or soy
480 products regularly but perceived it as desirable behaviour, they might have been likely to respond as
481 intending to increase their consumption. However, this tendency is weaker in online studies than
482 face-to-face interviews. Previous research has also shown that food consumption patterns are
483 habitual, and therefore individuals are not necessarily fully aware of the motives associated with
484 their food choices and consequently make *post hoc* justifications for their habits (Köster, 2009;
485 van't Riet, Sijtsema, Dagevos, & De Bruijn, 2011; Mäkiniemi & Vainio, 2014; Wood & Neal,
486 2009). However, the infrequent consumption of pulses in the data (Jallinoja *et al*, in press) suggests
487 that the majority of Finns do not feel social pressure to report frequent consumption of beans or soy
488 products. Moreover, although the TEMS scale is relatively new, it is possible that it does not
489 sufficiently take into account pro-environmental or ethical motives that have been found to be
490 important in explaining environmentally sustainable food choices (Honkanen, Verplanken, &
491 Olsen, 2006; de Boer, Schösler, & Boersema, 2013). The respondents having polytechnic, lower
492 and upper academic degrees were overrepresented in the data, which must be taken into account
493 when generalizing the findings to the Finnish population.
494 Despite these limitations, we suggest our results are useful for understanding how to
495 influence the sustainability of food choices via policy measures. First, close to a quarter of the
496 respondents consumed beef and no beans or soy products, nor did they have intentions to change
497 their patterns. Effecting a transformation from animal to plant proteins in this group may prove
498 difficult. Policy measures appealing to health, natural concerns and weight control are not likely to
499 be effective in this group either. However, the group could benefit from new food products in which
500 meat has been only partly replaced with plant proteins, and that are relatively cheap and easy to

prepare. Second, the results show that most beef-eaters do not object to eating plant proteins. Almost half of the respondents had established patterns in which beef eating was combined with consuming beans and/or soy products. These respondents can be interpreted to be consumers in a maintenance stage of including plant proteins in their diets, although it is uncertain how often and how much they actually consume plant-based protein. These findings suggest new possibilities for promoting flexitarianism and providing consumers with possibilities to add vegetable proteins to their diets. Promotional campaigns could focus on instructing how to make small and manageable changes in daily food choices, which have been found to be the key to successful dietary changes (Gardner *et al*., 2012). In the long run, this may also facilitate the acceptability of meat reduction strategies, and encourage people to reflect on the sustainability of their eating patterns.

To conclude, the results indicate that in a transformation process towards plant proteins, attention should be paid to the social aspects of eating and the social image of eating particular foods. In terms of public policies, our results suggest that advancing the consumption of plant proteins needs to take advantage of consumers' culturally accepted ideas of healthy and 'natural' foods. Moreover, public catering institutions in schools and workplaces could have an important influence by promoting plant proteins in both vegetarian dishes and dishes that combine meat and pulses. The accumulation of these kinds of incremental changes could advance sustainable (and healthier) culinary cultures (Mäkelä & Niva, 2016), which are needed to tackle the environmental load of food production and consumption.

Acknowledgements

This project was funded by the Finnish Ministry of Agriculture and Forestry and the Natural Resources Institute Finland (Luke). An earlier version of this paper was presented at the 143rd EAAE conference in Naples, 2015.

References

Adriaanse, M.A., de Ridder, T.D., & de Wit, J.B.F. (2009). Finding the critical cue: Implementation intentions to change one's diet work best when tailored to personally relevant reasons for unhealthy eating. *Personality and Social Psychology Bulletin*, 35, 60–71.

Arbuckle, J.L. (2011). *IBM® SPSS® Amos™ 21 User's Guide.* AMOS Development Corporation, Spring House, PA.

Bargh, J.A. (1994). The four horsemen of automaticity: awareness, intention, efficiency, and control in social cognition. In R.S. Wyer, & T.K. Srull (Eds.), *Handbook of social cognition: Vol 1 basic processes* (pp. 1–40). Hove: Lawrence Erlbaum Associates Publishers

Brown, T. (2006). *Confirmatory factor analysis for applied research*. New York, NY: Guilford Press.

de Boer, J. (2006). Introduction to consumer behaviour. In H. Aiking, J. de Boer, & J.M. Vereijken (Eds.), *Sustainable Protein Production and Consumption: Pigs or Peas?* (pp. 99–102). Dordrecht: Springer.

de Boer, J., Helms, M., & Aiking, H. (2006). Protein consumption and sustainability: Diet diversity in EU-15. *Ecological Economics*, 59, 267–274.

de Boer, J., Schösler, H., & Boersema, J.J. (2013). Climate change and meat eating: An inconvenient couple? *Journal of Environmental Psychology*, 33, 1–8.

Brunsø, K., & Grunert, K.G. (1995). Development and testing of a cross-culturally valid instrument: Food-related lifestyle. *Advances in Consumer Research*, 22, 475–480.

Carmines, E.G., & McIver, J.P. (1981). Analyzing models with unobserved variables. In G.W. Borhnstedt & E.F. Borgatta (Eds.), *Social measurement: Current issues*. Beverly Hills: Sage.

Chung, J., & Monroe, G.S. (2003). Exploring social desirability bias. *Journal of Business Ethics*, 44, 291–302.

550 Cubero, J.I. (2011). The faba bean: A historic perspective. *Grain Legumes*, 56, 5–8.
551 http://www.legumefutures.de/images/Grain_legumes_56_Faba_bean.pdf
552 Cunningham, J. (2009). How many vegetarians are there? *Vegetarian Journal*, 29, Article 3.
553 Dillman, D.A., Smyth, J.D., & Christian, L.M. (2009). Internet, mail, and mixed-mode surveys. The
554 tailored design method (3rd ed.). Hoboken, NJ: John Wiley & Sons.
555 Fiala, N. (2008). Meeting the demand. An estimation of potential future greenhouse gas emissions
556 from meat production. *Ecological Economics*, 67, 412–419.
557 Fiddes, N. (2004). *Meat: A natural symbol.* Routledge.
558 Freestone, O.M., & McGoldrick, P.J. (2007). Motivations of the ethical consumer. *Journal of*
559 *Business Ethics*, 79, 445–467.
560 Garnder, B., de Bruijin, G.J., & Lally, P.A. (2011). A systematic review and meta-analysis of
561 application of the Self-Report Habit Index to nutrition and physical activity behaviours.
562 *Annals of Behavioral Medicine*, 42, 174–187.
563 Godfray, H.C.J., Beddington, J.R., Crute, I.R., Haddad, L., Lawrence, D., Muir, J.F., Pretty, J.,
564 Robinson, S., Thomas, S.M., & Toulmin, C. (2010). Food security: The challenge of
565 feeding 9 billion people. *Science*, 327, 812–818.
566 Hjelmar, U. (2011). Consumers' purchase of organic food products. A matter of convenience and
567 reflexive practices. *Appetite*, 56, 336–344.
568 Helldán, A., Helakorpi, S.,Virtanen, S., & Uutela, A. (2013). Health behaviour and health among
569 the Finnish adult population. *National Institute for Health and Welfare Report, 21/2013*.
570 Holland, R.W., Aarts, H., & Langendam, D. (2006). Breaking and creating habits on the working
571 floor: A field-experiment on the power of implementation intentions. *Journal of*
572 *Experimental Social Psychology*, 42, 776–783.
573 Honkanen, P., Verplanken, B., & Olsen, O. (2006). Ethical values and motives driving organig food
574 choice. *Journal of Consumer Behaviour*, 5, 420-430.

575 Ipsos-Reid (2004). *Consumer perceptions of food safety and quality*. Agriculture and Agri-Food
576 Canada. Retrieved from:
577 http://www5.agr.gc.ca/resources/prod/doc/agr/pdf/Canadian_Perceptions.pdf
578 Jallinoja P, Niva M, Helakorpi S, Kahma N (2014) Food choices, perceptions of
579 healthiness and eating motives of self-identified followers of low-carbohydrate diet. *Food and*
580 *Nutrition Research,* 58, 1-9.
581 Jallinoja P, Niva M, Latvala T (in press) Towards more sustainable eating? Practices,
582 competence, meanings and materialities of bean eating in a meat-eating culture. *Futures.*
583 Kline, R.B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). NY, US:
584 Guilford Press.
585 Konttinen, H., Sarlio-Lähteenkorva, S., Silventoinen, K., Männistö, S., & Haukkala, A. (2012).
586 Socio-economic disparities in the consumption of vegetables, fruit and energy-dense foods:
587 The role of motive priorities. *Public Health Nutrition*, 16, 873–882.
588 Köster, E.P. (2009). Diversity in the determinants of food choice. A psychological perspective.
589 *Food Quality and Preference*, 20, 70–82.
590 Lally, P., van Jaarsveld, C.H.M., Potts, H.W.W., & Wardle, J. (2010). How are habits formed:
591 modelling habit formation in the real world. *European Journal of Social Psychology*, 40,
592 998–1009.
593 Lappalainen, R., Saba, A., Holm, L. Mykkänen, H., Gibney, M.J., & Moles, A. (1997). Difficulties
594 in trying to eat healthier: Descriptive analysis of perceived barriers for healthy eating.
595 *European Journal of Clinical Nutrition* 51, 36–40.
596 Lihatiedotus (2015). Meat consumption in the EU countries per capita.
597 http://lihatiedotus.fi/www/fi/tilastot/lihan_kulutus_euroopassa.php
598 Lindeman, M., & Väänänen, M. (2000). Measurement of ethical food choice motives. *Appetite*, 34,
599 55–59.

Magidson, J., & Vermut, J.K. (2002). Latent class model for clustering: A comparison with K-means. Canadian Journal of Marketing Research, 20, 37–44.

Magdison, J., & Vermut, J.K. (2004). Latent class models. In D. Kaplan (Ed.), *SAGE Handbook of Quantitative Methodology for the Social Sciences* (p. 175–198). Sage.

Mäkelä, J., & Niva, M. (2016). Citizens and sustainable culinary cultures. In: A. Paloviita, & M. Järvelä (Ed.) *Climate Change Adaptation and Food Supply Chain Management*. London and New York: Routledge.

Mäkiniemi, J.-P., & Vainio, A. (2014). Barriers to climate-friendly food choices among young adults in Finland. *Appetite*, 74, 12–19.

Natural Resources Institute Finland (Luke) (2013). *Balance sheet for food commodities 2012, preliminary and 2011 final figures.* At http://www.maataloustilastot.fi/en/balance-sheet-food-commodities-2012-preliminary-and-2011-final-figures_en

Nordic Council of Ministers (2013). Nordic Nutrition Recommendations 2012, Part 1: Summary, Principles and Use. *Nord 2013, 9.*

Official Statistics of Finland (2012). *Official statistics of Finland.* Helsinki: Advisory Board of OSF. At http://www.stat.fi/meta/svt/index_en.html

Pollard, T.M., Steptoe, A., & Wardle, J. (1998). Motives underlying healthy eating: Using the food choice questionnaire to explain variation in dietary intake. *Journal of Biosocial Science*, 30, 165–179.

Popp, A., Lotze-Campen, H., & Bodirsky, B. (2010). Food consumption, diet shifts and associated non-CO2 greenhouse gas emissions from agricultural production. *Global Environmental Change*, 20, 451–462.

Prochaska, J.O., & DiClemente, C.C. (1983). Stages and processes of self-change of smoking: toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, 31, 390–395.

625 Renner, B., Sproesser, G., Strohbach, & Schupp, H.T. (2012). Why we eat what we eat. The Eating
626 Motivation Survey (TEMS). *Appetite*, 59, 117–128.
627 Roininen, K., Tuorila, H., Zandstra, E.H., de Graafb, C., Vehkalahti, K., Stubenitsky, K., & Mela,
628 D.J. (2001). Differences in health and taste attitudes and reported behaviour among
629 Finnish, Dutch and British consumers: A cross-national validation of the Health and Taste
630 Attitude Scales (HTAS). *Appetite*, 37, 33–45.
631 Rossi, S.R., Greene, G.W., Rossi, J.S., Plummer, B.A., Benisovich, S.V., Keller, S., Velicer W.F.,
632 Redding C.F., Prochaska J.O., Pallonen U.E., & Meier K.S. (2001). Validation of
633 decisional balance and situational temptations: Measures for dietary fat reduction in a large
634 school-based population of adolescents. *Eating Behaviours*, 2, 1–18.
635 Rothman, A.J., Sheeran, P., & Wood, W. (2009). Reflective and automatic processes in the
636 initiation and maintenance of dietary change. *Annals of Behavioral Medicine*, 38, 4–17.
637 Ruby, M.B. (2012). Vegetarianism. A blossoming field of study. *Appetite*, 58, 141–150.
638 Scholderer, J., Brunsø, K., Bredahl, L., & Grunert, K.G. (2004). Cross-cultural validity of the food-
639 related lifestyles instrument (FRL) within Western Europe. *Appetite*, 42, 197–211.
640 Shurtleff, W., & Aoyagi, A. (2013). *History of soy products and soy products products (965 CE to*
641 *2013)*. Lafayette, CA: Soyinfo Center. http://www.soyinfocenter.com/pdf/163/Soy
642 products.Pdf
643 Smith, C., Burke, L.E., & Wing, R.R. (2000). Vegetarian and weight-loss diets among young
644 adults. *Obesity Research*, 8, 123–129.
645 Sorensen, G., Stoddard, A.M., Dubowitz, T., Barbeau, E.M., Bigby, J., Emmons, K.M., Berkman,
646 L.F., & Peterson, K.E. (2007). The influence of social context on changes in fruit and
647 vegetable consumption: Results of the Healthy Directions studies. *American Journal of*
648 *Public Health*, 97, 1216–1227.

649 Stehfest, E., Bouwman, L., van Vuuren, D.P., den Elzen, M.G.J., Eickhout, B., & Kabat, P. (2009).
650 Climate benefits of changing diet. *Climatic Change*, 95, 83–102.
651 Steptoe, A., Pollard, T.M., & Wardle, J. (1995). Development of a measure of the motives
652 underlying the selection of food. The food choice questionnaire. *Appetite*, 25, 267–284.
653 van't Riet, J., Sijtsema, S.J., Dagevos, H., & De Bruijn, G.J. (2011). The importance of habits in
654 eating behaviour. An overview and recommendations for future research. *Appetite*, 57,
655 585–596.
656 Verbeke, W., Pérez-Cueto, F.J.A., de Barcellos, M.D., Krystallis, A., & Grunert, K.G. (2010).
657 European citizen and consumer attitudes and preferences regarding beef and pork. *Meat*
658 *Science*, 84, 284–292.
659 Vinnari, M., & Tapio, P. (2009). Future images of meat consumption in 2030. *Futures*, 41, 269–
660 278.
661 Vinnari, M., Mustonen, P., & Räsänen, P. (2010). Tracking down trends in non-meat consumption
662 in Finnish households, 1966–2006. *British Food Journal*, 112, 836–852.
663 World Cancer Research Fund (2013). *Food, Nutrition and Physical Activity, and the Prevention of*
664 *Cancer: A Global Perspective.* Washington, DC: AICR.
665 http://www.dietandcancerreport.org/expert_report/
666 Wood, W., & Neal, D.T. (2009). The habitual consumer. *Journal of Consumer Psychology*, 19,
667 579–592.
668 York, R., & Gossard, M. (2004). Cross-national meat and fish consumption. Exploring the effects
669 of modernization and ecological context. *Ecological Economics*, 48, 293–302.